นิพนธ์ต้นฉบับ

อุบัติการณ์และปัจจัยเสี่ยง การคลอดก่อนนัดผ่าตัดซ้ำ ของหญิงที่มีประวัติผ่าตัดคลอดครรภ์ก่อน

ชาญ วัฒนาศรมศิริ, พ.บ.*, ณรงค์วัฒน์ สุริยะ, พ.บ.*, วัชรินทร์ เฉิดฉิ้ม, พ.บ.*, ปัญญา สนั่นพานิชกุล, พ.บ.*

* กลุ่มงานสูติ-นรีเวชกรรม โรงพยาบาลพระปกเกล้า

บทคัดย่อ

ที่มาของปัญหา : การคลอดก่อนนัดผ่าตัดซ้ำเป็นปัญหาที่พบบ่อยในเวชปฏิบัติสูติกรรม ซึ่งสัมพันธ์กับภาวะแทรกซ้อนของมารดาและทารกในครรภ์

วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์และปัจจัยเสี่ยงการคลอดก่อนนัดผ่าตัดซ้ำ ของหญิงตั้งครรภ์ที่มีประวัติผ่าตัดคลอดครรภ์ก่อน ในโรงพยาบาลพระปกเกล้า

วัสดุและวิธีการ: เป็นการศึกษาเชิงสาเหตุและพยากรณ์ รวบรวมข้อมูลย้อนหลัง ประชากรศึกษา ได้แก่ หญิงตั้งครรภ์ อายุครรภ์มากกว่าหรือเท่ากับ 39 สัปดาห์ ที่มีนัดผ่าตัดคลอดซ้ำ ในโรงพยาบาลพระปกเกล้า ในช่วงเดือนมกราคม พ.ศ. 2557 ถึงเดือนมีนาคม พ.ศ. 2559 จำนวน 601 ราย ศึกษาอุบัติการณ์และปัจจัยเสี่ยง การคลอดก่อนนัดผ่าตัดซ้ำ โดยรวบรวมข้อมูลประชากรศาสตร์และข้อมูลสูติศาสตร์ วิเคราะห์ข้อมูลทางสถิติโดยใช้การทดสอบไคสแควร์ เพื่อแสดงความแตกต่างของสัดส่วนประชากรที่มีปัจจัยเสี่ยง และ การสร้างตัวแบบเชิงเส้น เพื่อแสดงค่าความเสี่ยงสัมพัทธ์

ผลการศึกษา: พบว่า อัตราการคลอดก่อนนัดผ่าตัดซ้ำเท่ากับร้อยละ 52.9 (n=318) ปัจจัยที่สัมพันธ์กับการคลอดก่อนนัดผ่าตัดซ้ำ ได้แก่ การตั้งครรภ์ที่มีจำนวนการคลอดมากกว่าหรือเท่ากับ 2 ครั้ง มีประวัติผ่าตัดคลอดมากกว่าหรือเท่ากับ 2 ครั้ง มีประวัติคลอดก่อนกำหนด มีประวัติคลอดบุตรน้ำหนักตัวน้อย ฝากครรภ์น้อยกว่า 4 ครั้ง และ มีความดันโลหิตสูงระหว่างตั้งครรภ์ พบว่า การคลอดก่อนนัดผ่าตัดซ้ำ ในการตั้งครรภ์ที่ฝากครรภ์น้อยกว่า 4 ครั้ง มากขึ้น 1.7 เท่า (RR 1.04-2.80, p=0.035) และการตั้งครรภ์ที่มีประวัติคลอดก่อนกำหนดมากขึ้น 1.5 เท่า (RR 0.87-2.69, p=0.144)

สรุป: การคลอดก่อนนัดผ่าตัดซ้ำ ของหญิงตั้งครรภ์ที่มีประวัติผ่าตัดคลอดครรภ์ก่อน อาจพบได้มากกว่าครึ่งหนึ่งของประชากรที่นัดผ่าตัดคลอดซ้ำ ปัจจัยเสี่ยงที่เพิ่มโอกาสคลอดก่อนนัดผ่าตัดซ้ำจากการวิเคราะห์พหุปัจจัย ได้แก่ การตั้งครรภ์ที่ฝากครรภ์น้อยกว่า 4 ครั้ง

คำสำคัญ: การผ่าตัดคลอดซ้ำ; ประวัติผ่าตัดคลอดครรภ์ก่อน; การคลอดก่อนนัดผ่าตัดซ้ำ; ปัจจัยเสี่ยงการคลอดก่อนนัดผ่าตัดซ้ำ

Original article

Unplanned Deliveries before Elective Repeat Cesarean Section: Incidence and Risk Factors

Charn Watanasomsiri, M.D.[*], Narongwat Suriya, M.D.[*], Watcharin Chirdchim, M.D.[*], Panya Sananpanichkul, M.D.[*]

[*]Department of Obstetrics and Gynaecology, Prapokklao Hospital

Abstract

Background : Unplanned deliveries before elective repeat cesarean section (ERCS) were common obstetric problems associated with both maternal and neonatal morbidities.

Objective: To study the incidence and risk factors related to unplanned deliveries in pregnant women with a schedule of elective repeat cesarean section (ERCS)

Materials and Methods: Six hundred and one pregnant women with a schedule of ERCS at Prapokklao Hospital from January 1st, 2014 to March 31st, 2016 were recruited. Incidence of unplanned deliveries was investigated. Demographic and obstetric characteristics were compared between unplanned and scheduled delivery group. Proportion difference and relative risk were analyzed by using chi-square test and generalized linear model.

Results: Incidence of unplanned deliveries was 52.9 %. Pregnant women with parity ≥2, the number of prior cesarean sections ≥2, history of preterm birth, history of fetal low birth weight, the number of antenatal care visits <4 or pregnancy-associated hypertension experienced more unplanned deliveries significantly. Pregnant women with the number of antenatal care visits <4 had 1.7 times more risk of unplanned deliveries (95 % CI 1.04-2.80, *p*=0.035), whereas women with history of preterm birth had 1.5 times more risk (95% CI 0.87-2.69, p=0.144).

Conclusions: Unplanned deliveries in pregnant women scheduled for ERCS beyond 39 weeks of gestation occurred about a half. By using multivariate analysis, the number of antenatal care visits <4 was considered to be a prognostic factor related to unplanned deliveries.

Key words: elective repeat cesarean section (ERCS), prior cesarean section, unplanned deliveries, risk of unplanned deliveries

Introduction

History of prior cesarean section is one of the most common indications for cesarean section procedure.[1-2] The number of vaginal births after cesarean deliveries (VBAC) had decreased over the past decade because of high complication rate. These morbidities included uterine rupture, need of blood transfusion, odds of emergency cesarean section, and neonatal asphyxia.[3-4] The incidence of uterine rupture relating to failed trial of labor was 1.3% compared to 0.4% in repeat cesarean section group.[5]

Gestational age at the time of operation also affected pregnancy outcomes. Deliveries before 39 weeks of gestation were associated with neonatal respiratory morbidities.[6-10] Neonatal death and respiratory distress were 15.3% at 37 weeks of gestation deliveries compared to 8.0% at 39 weeks of gestation deliveries.[6]

Elective repeat cesarean section (ERCS) beyond 39 weeks of gestation is a current practice in Prapokklao Hospital: a tertiary hospital in eastern Thailand. However, advanced gestational age might result in a number of unplanned deliveries.[1, 9-12]

Unplanned deliveries before ERCS were associated with both maternal and neonatal morbidities including postpartum hemorrhage, admission to neonatal intensive care unit and prolonged neonatal hospitalization.[1, 13-15] In low risk pregnancy, rate of unplanned deliveries before the scheduled date at tertiary centers in New South Wales, Australia was 14.3%.[16] Asian-born, teenage pregnancy, smoking, history of multiple cesarean sections and preterm birth may relate to these unplanned deliveries.[1, 12, 16] History of spontaneous preterm birth had the highest relative risk among variables (RR 4.12, 95% CI 3.38-5.03).

The impact of unplanned deliveries before ERCS had increased as a result of high global rate of cesarean section procedure. There was no current data overviewing the incidence, especially in Asian population. The number of unplanned deliveries before ERCS at Prapokklao Hospital and their related risk factors were explored as the aim of this study.

Objective

The study was aimed to demonstrate the incidence and risk factors related to unplanned deliveries in pregnant women with a schedule of elective repeat cesarean section (ERCS) beyond 39 weeks of gestation.

Materials and Methods

The study protocol was approved by Chanthaburi Ethics Committee (CTIREC). A retrospective study was conducted at Prapokklao Hospital, Thailand. There were 1,210 medical records of pregnant women with history of prior cesarean section delivered between January 1st, 2014 and March 31st, 2016. The exclusion criteria were pregnancies

with no schedule of ERCS, scheduled ERCS before 39 weeks of gestation, multifetal pregnancies, placenta previa and non-Asian population.

Sample size calculation was based on proportion comparison between two groups following history of preterm birth. Pregnant women with history of spontaneous preterm birth resulting in unplanned delivery and scheduled delivery were 6.9% and 1.9% respectively.[16] With 5% maximum allowable error and 80% power, the least number which demonstrated an association was 260 pregnancies in each group.

Index variables were the outcome of delivery and gestational age. Deliveries before the scheduled date of ERCS regardless of cause and route of delivery considered to be unplanned delivery outcome. Gestational age was calculated from the first day of the last normal menstrual period or from ultrasonography when there was a discrepancy according to redating criteria.[17-18] Demographic and obstetric characteristics were collected from operation schedule book, labor room record and inpatient medical chart.

Demographic variables included maternal age, race, residency, education and smoking. Obstetric characteristics included parity, the number of prior cesarean sections, the number of antenatal care visits, gestational age at first antenatal care visit, prepregnancy body mass index and fetal presentation at delivery. History of preterm birth, fetal low birth weight, fetal macrosomia, mutifetal pregnancy, fetal stillbirth and abortion were gathered. Chronic hypertension, diabetes mellitus and other medical conditions of pregnant women were concerned. Obstetric complications included pregnancy-associated hypertension, fetal-growth disorders and chorioamnionitis were also investigated.

Each variable was classified and reported in number with percentage. Chi-square test was used to demonstrate proportion difference between groups. Relative risk and 95% confidence interval were calculated by using generalized linear regression model. Type I error was defined as 5% to consider statistical significance. The power of this study was 80%.

Results

There were 1,210 pregnant women with history of prior cesarean section during the study period. Of these, 15.3% (n=185) had no schedule of ERCS, 33.1% (n=401) had scheduled ERCS before 39 weeks of gestation, 0.7% (n=8) had multifetal pregnancy, 0.9% (n =11) had placenta previa, and 0.3% (n=4) were non-Asian population. There were 601 deliveries that matched the criteria. Unplanned deliveries was 52.9% (n=318) in the authors' study. (Fig. 1).

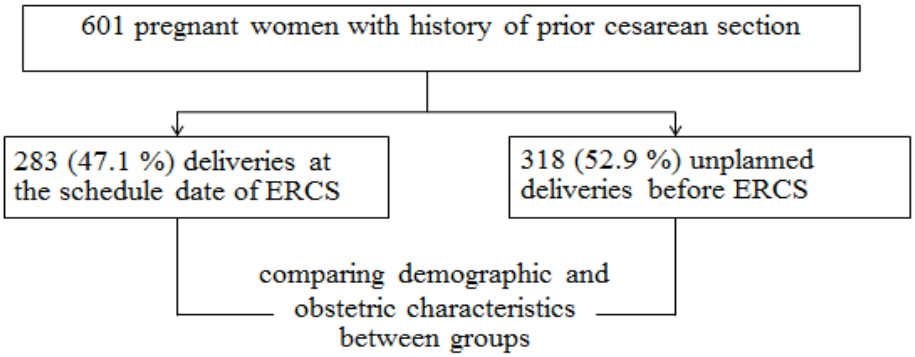

Fig. 1 Study flow diagram

Within unplanned deliveries group, most (82.1%, n=261) had labor progression without ruptured membranes or specified conditions. The occurrences of ruptured membranes, distressed fetus and uncontrolled hypertension were 13.8% (n=44), 2.8% (n=9) and 1.3% (n=4) respectively. Concerning about gestational age at the time of unplanned deliveries, there were 11.3% (n=36) before 37 weeks of gestation, 23.3% (n=74) at 37-37^{+6} weeks of gestation, 41.5% (n=132) at 38-38^{+6} weeks of gestation and 23.9% (n=76) beyond 39 weeks of gestation.

Nearly 7% (n=22) of unplanned deliveries were referred during intrapartum period. Out-of-hours deliveries were 61% (n=194) and vaginal delivery (VBAC) was 3% (n=10). There were 2 neonates (0.6%) admitted to neonatal intensive care unit due to neonatal asphyxiation. Use of general anesthesia, immediate postpartum hemorrhage >1000 ml, need of blood transfusion and neonatal low birth weight had also increased in unplanned deliveries group. There were no significant demographic characteristics related to unplanned deliveries (Table 1). Pregnant women with parity ≥2, the number of prior cesarean sections ≥2, history of preterm birth, history of fetal low birth weight, number of antenatal care visits <4 or pregnancy-associated hypertension experienced more unplanned deliveries significantly. (Table 2).

Table 1 Demographic characteristics of study population

Characteristics	Unplanned deliveries before ERCS (n = 318)	Success deliveries at scheduled date of ERCS (n = 283)	*p*-value
Age (year)			0.759
<20	14 (4.4)	12 (4.2)	
20-<35	227 (71.4)	195 (68.9)	
≥35	77 (24.2)	76 (28.9)	
Race			0.425
Thai	302 (95.0)	273 (96.5)	
Foreign	16 (5.0)	10 (3.5)	
Residency			0.083
Urban Chanthaburi	91 (28.6)	85 (30.0)	
Rural Chanthaburi	196 (61.6)	184 (65.0)	
Other province	31 (9.8)	14 (5.0)	
Education			0.134
Elementary school	68 (21.4)	53 (18.7)	
Secondary/ occupational school	159 (50.0)	159 (56.2)	
Graduate degree	66 (20.7)	60 (21.2)	
Not specified	25 (7.9)	11 (3.9)	
Smoking	2 (0.6)	0 (0.0)	0.280

ERCS, elective repeat cesarean section

Table 2 Obstetric characteristics of study population

Characteristics	Unplanned deliveries before ERCS (n = 318)	Success deliveries at scheduled date of ERCS (n = 283)	*p*-value
Parity			0.007
1	257 (80.8)	250 (88.3)	
≥2	61 (19.2)	33 (1.7)	
Number of prior cesarean sections			0.044
1	283 (89.0)	264 (93.3)	
≥2	35 (11.0)	19 (6.7)	
History of preterm birth	19 (6.0)	3 (1.1)	0.001
History of fetal low birth weight	28 (8.8)	14 (4.9)	0.044
History of fetal macrosomia	8 (2.5)	7 (2.5)	0.592
History of multifetal pregnancy	3 (0.9)	1 (0.3)	0.626
History of fetal stillbirth	2 (0.6)	0 (0.0)	0.501
History of abortion	61 (10.2)	49 (17.3)	0.598
Number of antenatal care visits			< 0.001
<4	17 (5.4)	1 (0.4)	
≥4	301 (94.6)	282 (99.6)	

Table 2 Obstetric characteristics of study population

Characteristics	Unplanned deliveries before ERCS (n = 318)	Success deliveries at scheduled date of ERCS (n = 283)	*p*-value
GA at first antenatal care visit			0.806
<12 weeks	148 (46.5)	135 (47.7)	
≥12 weeks	170 (53.5)	148 (52.3)	
Prepregnancy BMI (kg/m^2)			0.520
<18.5	28 (8.8)	29 (10.2)	
18.5-24.9	195 (61.3)	159 (56.2)	
25.0-29.9	68 (21.4)	63 (22.3)	
≥30.0	27 (8.5)	32 (11.3)	
Presentation of fetus at delivery			0.065
Vertex	300 (94.3)	275 (97.2)	
Non-vertex	18 (5.7)	8 (2.8)	
Maternal medical conditions			
Chronic hypertension	7 (2.2)	4 (1.4)	0.553
Diabetes mellitus	33 (10.4)	28 (9.9)	0.893
Thyrotoxicosis	1 (0.3)	2 (0.7)	0.604
Hypothyroidism	1 (0.3)	2 (0.7)	0.604
Obstructive lung diseases	1 (0.3)	3 (1.1)	0.347
Obstetric complications			
Pregnancy-associated hypertension	18 (5.7)	5 (1.8)	0.010
Fetal-growth disorders	1 (0.3)	0 (0.0)	0.529
Chorioamnionitis	1 (0.3)	0 (0.0)	0.529

ERCS, elective repeat cesarean section; GA, gestational age; BMI, body mass index

The regression analysis of six variables was presented (Table 3). By using univariate analysis, pregnancies with the number of antenatal care visits <4 and history of preterm birth had 1.8 times more risk (RR 1.83, 95% CI 1.12-2.99, *p*=0.015) and 1.7 times more risk of unplanned deliveries (RR 1.67, 95% CI 1.05-2.66, *p*=0.030) respectively. The number of antenatal care visits <4 was considered to be significant risk factors by using multivariate analysis (RR 1.71, 95% CI 1.04-2.80, *p*=0.035).

Table 3. Risk factors related to unplanned deliveries before elective repeat cesarean section

Factors	crude RR	95% CI	*p*-value	adjusted RR	95% CI	*p*-value
Parity ≥2	1.28	0.97-1.69	0.083	1.18	0.78-1.78	0.438
Number of cesarean sections ≥2	1.25	0.88-1.78	0.208	1.06	0.63-1.76	0.834
History of preterm birth	1.67	1.05-2.66	0.030	1.53	0.87-2.69	0.144
History of fetal low birth weight	1.29	0.87-1.89	0.205	0.99	0.61-1.58	0.956
Number of antenatal care visits <4	1.83	1.12-2.99	0.015	1.71	1.04-2.80	0.035
Pregnancy-associated hypertension	1.51	0.94-2.43	0.091	1.51	0.94-2.42	0.092

RR, relative risk; CI, confidence interval

Discussion

The number of unplanned deliveries before ERCS was underestimated. About one fourth of these unplanned deliveries were at 38-38+6 weeks of gestation. Spontaneous onset of labor without other specified conditions was a major cause of the deliveries.

The incidence of unplanned deliveries in the authors' study was much higher than the previous Australian study, but it was close to one from Southeast Asian.[1, 16] Phaloprakarn, et al. reported 55.1% of unplanned deliveries scheduled for cesarean section beyond 37 weeks of gestation. This may support the theory about a difference of genetic variation in the time of fetal maturation in utero between white and Asian.[1,6]

The number of antenatal care visits <4 and history of preterm birth were independent risk factors related to unplanned deliveries in pregnancies with history of prior cesarean section. Physicians may discuss this information with pregnant women, and also consider earlier time of operation and intensive monitoring.

Prenatal care helps identify pregnancy risk and support medical coordination of patients. This results in an improvement of peripartum outcome and maternal well-being throughout pregnancy. World Health Organization recommends a minimum of four antenatal visits and one first trimester visit for certain risk screening.[19] As expected, pregnancy with the number of antenatal care visits <4 was associated with unplanned deliveries before ERCS (RR 1.71, 95% CI 1.04-2.80). Community health education about benefits of antenatal care should be encouraged.

History of preterm birth was one of major risks for a subsequent preterm birth.[20] The authors' study and Roberts, et al's reported 1.5 and 4.1 times more risk of unplanned deliveries before ERCS respectively. Careful history review accompanying with progesterone therapy, cervical length determination, cervical cerclage, cervicovaginal fibronectin measuring and close surveillance could reduce morbidities.

Cigarette smoking was associated with numerous adverse pregnancy outcomes such as preterm birth, placental abruption and spontaneous abortion.[21] The authors could not find any difference of unplanned deliveries in smoking group (RR 1.90, 95% CI 0.47-7.61). This is not the same as reported by Roberts, et al. (RR 1.37, 95% CI 1.18-1.59). Loss of statistical significance may result from a small number of exposures in study population.

The strength of this study was population selection method. History of prior cesarean section was a single clear indication of given intervention. High risk pregnancies anticipated to have preterm birth, such as multifetal preganancy and placenta previa, were excluded. Furthermore, there was a policy that every pregnant woman with history of prior

cesarean section in the primary hospital nearby should be referred to Prapokklao Hospital. This reduced a population sampling bias. However, there were few limitations due to its retrospective study design. Environmental factors such as household smoking behavior, diet, and socioeconomic status could not be identified. Proposing a correlation magnitude of specific prognostic factors may be studies in the near future.

In conclusion unplanned deliveries in pregnant women scheduled for ERCS beyond 39 weeks of gestation occurred about a half. By using multivariate analysis, the number of antenatal care visits <4 was considered to be a prognostic factor related to unplanned deliveries.

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